122804
SHAUGHNESSY NO.

REVIEW NO.

EEB REVIEW

DATE: IN 8/6/85 OUT OCT 29 1985

FILE OR REG. NO. 618-OG; 618-OU

PETITION OR EXP. PERMIT NO.

DATE OF SUBMISSION 7/12/85

DATE RECEIVED BY HED 8/2/85

RD REQUESTED COMPLETION DATE 10/30/85

EEB ESTIMATED COMPLETION DATE 10/23/85

RD ACTION CODE/TYPE OF REVIEW 120/New Chemical

TYPE PRODUCT(S): I, D, H, F, N, R, S Fire Ant Bait (Insecticide)

DATA ACCESSION NO(S). 258746

PRODUCT MANAGER NO. 15-La Rocca

PRODUCT NAME(S) Affirm Fire Ant Bait and Insecticide-Avermectin

COMPANY NAME Merck Sharp and Dohme Research Laboratories

SUBMISSION PURPOSE Resubmission of Applications For Registration of Affirm (618-OG), (618-OU). Data Reviews

SHAUGHNESSY NO.	CHEMICAL & FORMULATION	% A.I.
122804	Abamectin	0.011%

ECOLOGICAL EFFECTS BRANCH

REVIEW

Avermectin

100 Submission Purpose and Label Information

100.1 Submission Purpose and Pesticide Use

Avermectin is the active ingredient in Affirm Fire Ant Bait (618-OG) and Affirm Fire Ant Insecticide (618-OU). Both are proposed to be used to control imported fire ants on turf, lawns, and nonagricultural areas. This excludes pastures rangelands and croplands.

100.2 Formulation Information

Both products have the following formulation.

Active Ingredient

Abamectin [A mixture of avermectins containing $\geq$ 80% avermectin B_1 a (5-O-demethyl-avermectin A_1 a) and $\leq$ 20% avermectin B_1b (5-O-demethyl-25-de(1-methylpropyl)-25-(1-methylethyl)avermectin A_1a)] 0.011%

Inert Ingredient 99.989%

1 lb of Affirm contains 50 mg abamectin (0.00011 lbs)

Both are formulated into [redacted]

100.3 Application Methods, Directions, Rates

Affirm is a stomach insecticide which acts slowly to reduce fire ant colonies. An effective fire ant insecticide should be slow acting so that the bait can be passed by the workers throughout the ant colony and eventually to the queen. Affirm is toxic to fire ants; however, it is most effective against the fire ant queen and causes an immediate halt of egg production and disappearance of worker brood. The disappearance of worker ants leads to the decline and eventual elimination of the fire ant colony.

Apply when ants are actively foraging [typically when soil temperatures are greater than 60 °F (15 °C)] or consult your State agricultural experiment station or State extension service for optimum timing of application.

Apply after dew or rainfall has dried off for maximum effectiveness. For best results, do not apply if rainfall is anticipated within 4 to 6 hours after application.

Affirm Fire Ant Insecticide Bait (618-OG) is packaged in 25-lb containers.

BROADCAST APPLICATION - Apply 1 pound of Affirm per acre (1 lb/A) using properly calibrated aerial or ground equipment to assure proper dosage and uniform distribution.

INDIVIDUAL MOUND TREATMENT - Use 5 to 7 tablespoons of Affirm per mound. Sprinkle the bait uniformly over the mound and for a distance of approximately 2 feet out from the base of the mound. Apply at a rate of 1 lb of bait per acre. Do not contaminate kitchen utensils with this product.

Affirm Fire Ant Insecticide (618-OU) is packaged in 1 lb containers.

BROADCAST APPLICATION - Sprinkle Affirm uniformly on turf, lawns, and nonagricultural areas. Do not exceed 1 lb of bait per acre.

INDIVIDUAL MOUND TREATMENT - Use 5 to 7 tablespoons of Affirm per mound. Sprinkle the bait uniformly over the mound and for a distance of approximately 2 feet out from the base of the mound. Do not apply more than 1 lb of bait per acre. Do not contaminate kitchen utensils with this product.

100.4 Target Organism

Fire Ants

100.5 Precautionary Labeling

ENVIRONMENTAL HAZARDS

This pesticide is toxic to fish. Keep out of lakes, ponds, or streams. Do not contaminate water by cleaning of equipment or disposal of wastes.

101 Hazard Assessment

101.1 Discussion

Fire ants occur throughout the South from eastern Texas to the east coast. This use provides for control of fire ants on turf, lawns, and nonagricultural areas. In their "Response to the Ecological Effects Branch Review"

(July 12, 1985, Accession No. 258746) Merck, Sharp, and Dohme Research Laboratories specifically states that this use excludes applications to pastures, rangelands, and croplands (page 4). This restriction substantially reduces exposure potential compared to the original registration request (EEB review dated June 29, 1984), which included pastures and rangelands.

Affirm may be applied by aerial equipment (618-OG). Use rate is 0.00011 lbs ai per acre. It is a granular product so drift will not be a problem.

Abamectin (MK-936) may persist in the field with a half-life of a month. This was based on a field dissipation study reviewed by EAB (September 5, 1985 review). However, based on anther EAB review (August 28, 1985), it is reported that abamectin has a photolytic half-life of 3.5 to 12 hours (section 10.1c). Apparently, as long as it is on the soil or other surfaces and exposed to light it will degrade rapidly. Also, it degrades rapidly in an aqueous solution.

Based on discussions with Dr. Akiva Abramovitch of EAB and EAB's reviews, abamectin breaks down initially to the avermectin B_1a isomer (p. 6, EAB review, March 28, 1984, EUP on citrus) in a short time (< 12 hrs). Then this and other primary degradates have half-lives of a similar order of magnitude (p. 3, EAB review, August 28, 1985). Evidently, after 27 hours or so, the primary degradate is the polar metabolite (pages 10 to 13 of Merck, Sharpe, and Dohme Research Laboratories document "Response to the Ecological Effects Branch Review" Accession No. 258746).

Avermectin bioaccumulates only slightly (110 x maximum) in fish. Dupuration is 95 percent in 14 days.

122804 Avermectin

Rational for data requests =

- Fire Ants is an extensive use
- Aerial application
- ~~Heavy~~ Very highly toxic
- a slow working product.
- Could be exposure of more unaffected habitats

4

Summary of Toxicity

Species	Test Material	Results	Category
Bobwhite quail	91%	LD_{50} > 2000 mg/kg	Core
Bobwhite quail	91%	LC_{50} = 3102 ppm	Core
Mallard duck	91%	LC_{50} = 383 ppm	Core
Bluegill	91%	LC_{50} = 9.6 ppb	Core
Rainbow trout	91%	LC_{50} = 3.2 ppb	Core
Daphnia	91%	LC_{50} = 0.34 ppb	Core
Daphnia	MK-936 Teh	LC_{50} = 0.22 ppb	Core
Daphnia	Avermectin B_1a	LC_{50} = 0.42 ppb	Core
Daphnia	Polar metabolite*	LC_{50} = 4.2 ppb (binomial)	Core
		21.0 ppb (moving average)	Core
Daphnia	Moderately polar	6.3 ppb	Core
Daphnia	Nonpolar metabolite	25.4 ppb	Core
Daphnia	Thin film polar metabolite*	76.7 ppb	Core
Shrimp, mysid		LC_{50} = 0.2 ppb	Core
Fathead minnow		LC_{50} = 15 ppb	Core
Oyster embryolarvae	48-hr	LC_{50} = 430 ppb	Core

Avermectin is highly toxic to very highly toxic to mammals (mouse LD_{50} = 13 to 23 mg/kg; rat LD_{50} = 10 to 11 mg/kg; weanling rat LD_{50} = 1.5 mg/kg). It has an effect on reproduction in rats at 0.1 to 0.5 mg/kg/day.

The nonpolar metabolite has an LD_{50} of > 48 mg/kg in mice. The polar* metabolite has an LD_{50} of > 5000 mg/kg in mice.

* The polar metabolite is the last one formed and is what the parent becomes after about 27 hours.

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101.2 Likelihood of Adverse Effects to Nontarget Organisms Terrestrial

As a granular, Avermectin will not occur as a residue on terrestrial food items. The primary route of exposure would be through direct ingestion.

At the label rates there would be 50 mg of ai per acre. Assuming an LD_{50} of 10 mg/kg for an adult mammal, a 1 kg mammal would have to eat all the granules in 8712 ft^2.

$$\frac{10 \text{ mg/kg}}{50 \text{ mg/acre}} = 0.2 \times 43{,}560 \text{ ft}^2\text{/acre} = 8712 \text{ ft}^2$$

Assuming an LD_{50} for young mammals of 1.5 mg/kg, a 2 oz young mammal would have to eat 0.085 mg avermectin to equal the LD_{50}. A 2 oz rat would have to eat all the granules in 74 ft^2 (7' x 10' plot).

$$\frac{0.085 \text{ mg}}{50 \text{ mg/acre}} = 0.0017 \times 43{,}560 = 74 \text{ ft}^2$$

Avermectin is less toxic to birds than to mammals so birds of equivalent size would have to eat more granules to receive a lethal dose. It is unlikely that birds or mammals would eat enough granules to experience an acute effect.

Avermectin breaks down rapidly in the presence of light. Therefore, if it is on the soil surface or on plant surfaces, it is expected to breakdown before it can have any adverse chronic effects to terrestrial organism.

Aquatic

Direct application to water may occur and would result in the following residues:

Depth	Concentration (in standing water)
6 inches	0.08 ppb
1 feet	0.04 ppb
3 feet	0.01 ppb

These levels are below the lowest LC_{50}'s available (daphnia = 0.22 ppb; shrimp = 0.20 ppb). The concentrations in flowing water would be less also. Runoff may occur but would result in residues even lower than those from direct application. These residues would not have an adverse acute effect on either freshwater or estuarine organisms.

Avermectin is expected to photodegrade in water within a few days. Therefore, no adverse chronic effects to aquatic or estuarine organisms are expected. The degradation products are less toxic than the parent and tend to become less toxic as they continue to degrade.

101.3 Endangered Species

These proposed uses are not expected to have an adverse effect on endangered species because of the low use rate. Avermectin will not be available to endangered terrestrial species at levels great enough to have an adverse effect. It will not occur in water at concentrations great enough to have an adverse effect on endangered aquatic species.

101.4 Adequacy of Toxicity Data

The registrant submitted a "Response to the Ecological Effects Branch Review" July 12, 1985, Accession No. 258746. That document included a report of six acute studies with Daphnia magna. The test materials were Avermectin MK-936, Avermectin $B_{1}a$, and degradates of Avermectin. The tests were validated as scientifically sound and they fulfilled the guideline requirements for acute testing with an aquatic invertebrate and degradation products. They resulted in the following LC_{50} values.

Test Material	Binomial	Moving Average	Probit
MK-936 #a	0.22 ppb	0.24 ppb	*
Avermectin $B_{1}a$ #2	0.62 ppb	0.61 ppb	*
Repeat Sample #2	0.42 ppb	0.47 ppb	0.54 ppb
** Polar Met. Sample #3	4.2 ppb	21.0 ppb	*
** Mod Polar Sample #4	7.1 ppb	6.3 ppb	*
** Nonpolar Sample #5	25.9 ppb	25.4 ppb	*
** Thin Film Meta. #6	76.7 ppb	76.7 ppb	66.5

* Since the goodness-of-fit probability is less than 0.05, results of the probit method are not used.
** Metabolites of avermectin.

Two estuarine studies were submitted October 3, 1985. The results are included in the "Summary of Toxicity."

101.5 Adequacy of Labeling

The Environmental Hazards label should include a statement about toxicity to wildlife because avermectin is highly toxic to mammals.

> This pesticide is toxic to fish and wildlife. Do not apply this pesticide to water. Keep out of lakes, streams, or ponds. Do not contaminate water by cleaning of equipment or disposal of wastes.

7

Furthermore, EEB is concerned that the term "non-agricultural" may not be interpreted as excluding rangeland and pastureland. We performed our hazard assessment assuming these areas will not be treated. Also, EEB assumes one application with possible retreatment in 3 to 4 months per year. The label should specify both these limitations.

102 Conclusions

EEB has completed a full risk assessment (3(c)(5) finding) of the proposed registration of Affirm Fire Ant Bait (6180G and 618-OU) to control imported fire ants. Based upon the available data and use information EEB concludes that the proposed use provides for minimal hazards to nontarget organisms provided the label is modified as shown in 101.5 above: i.e., (1) the Environmental Hazards labeling is added/modified; (2) the label carries an exclusion for application to rangeland and pastureland; and (3) the label states that one application, with possible retreatment in 3 to 4 months, per year is recommended.

Daniel Rieder 10/29/85
Daniel Rieder
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EEB/HED

Norman Cook 10.31.85
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Michael Slimak 11/4/85
Michael Slimak
Chief, Ecological Effects Branch
Hazard Evaluation Division

122804
Shaughnessey No.

DATA EVALUATION REPORT

ECOLOGICAL EFFECTS BRANCH

1. CHEMICAL: Affirm
   Sha. No: 122804

2. TEST MATERIAL: Avermection B_1, Avermectin B_{1a} Standard and 4 photodegradates.

3. STUDY/ACTION TYPE: 48-hour LC_{50} with Daphnia magna

4. STUDY ID: Author: Naimie, Hussein, Susan Anton, and Larry Kaelin
   Title: Results of Daphnid Bioassay of MK-0936, Avermectin B_{1a} Standard, Polar and Nonpolar Metabolites from a Water Photolysis Reaction of Avermectin B_{1a} Standard.
   Laboratory: Merck, Sharp and Dohme Research Laboratory
   Study No./Date: Appendix 2 of Acc. No. 258746 / July, 1985
   Study submitted to EPA by: Merck, Sharp and Dohme Laboratories
   Acc. No: 258746

5. REVIEWED BY: Daniel Rieder
   Wildlife Biologist
   EEB/HED
   Signature: Daniel Rieder 11/5/85
   Date: _____

6. APPROVED BY: Norman Cook
   Head-Section 2
   EEB/HED
   Signature: Norman Cook
   Date: 11-5-85

7. CONCLUSIONS: This study is scientifically sound.
   See Table I for reported LC_{50}'s.
   These results support registration of Affirm.

TEST MATERIAL	BINOMIAL	MOVING AVERAGE	PROBIT
MK-936 #1 ----------	0.22 ppb --	0.24 ppb ----	*
Avermectin Bla #2 ---	0.62 ppb --	0.61 ppb ----	*
Repeat Sample #2 ----	0.42 ppb --	0.47 ppb ----	*
Polar Met Sample #3 -	4.2 ppb --	21.0 ppb ----	*
Mod. Polar Sample #4 ---------	7.1 ppb --	6.3 ppb ----	*
Nonpolar Sample #5 --	25.9 ppb --	25.4 ppb ----	*
Thin Film Meta. #6 --	76.7 ppb --	76.7 ppb ----	66.5

* Since the goodness of fit probability is less than 0.05, results of the probit method are not used.

8. RECOMMENDATIONS: NA

9. BACKGROUND:

This test was performed to demonstrate the toxicity of Avermectin and its photo-degradates. Avermectin has a fairly short half-life, <24hrs in sunlight. EEB was concerned with the toxicity of the photodegradates. Daphnids were used since they were more sensitive to avermectin than the fish.

10. DISCUSSION OF INDIVIDUAL TESTS: The tests are discussed together in the following sections.

11. TEST METHODS/MATERIALS

Test Material: Avermectin (MK-936), Avermectin Bla Standard, and 4 Photo-degradates.

Percent active Ingredient: Assumed 100% a.i.
See attachment 1 for test material description.

Test Organism

Species: Daphnia magna
Acclimation: at 20°+ 1°C
Number/concentration: 20
Age/Stage: <24 hours
Source: EPA's stock culture at Duluth

Test Containers: glass

Size: 400 ml containing 300 ml water
Aerated: No
Organisms per container: 10
Replicates: 2

Test Conditions

Photoperiod: 12 hrs/day
Temperature: 20°C
Controls: Solvent Control only
Solvent: Methanol or acetone
Way test was begun: organisms added to test solution.
Measured Concentrations: No
Test Solution: Reconstituted hard water

References:

1. "Standard Method for the Examination of Water and Wastewater", 16th Edition, prepared and published jointly by APHA, AWWA, WPCF, 1985.

2. "Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms", Environmental Monitoring and Support Laboratory - Cincinnati, Ohio, EPA-600/4-83-000, Third editions, May 1983.

3. "Methods for Acute Toxicity Tests with Fish, Macroinvertebrates and Amphibians", National Water Quality Laboratory, EPA-660/3-75-009, April 1975.

12. REPORTED RESULTS:
See attachment 2
Table 1 48-hour LC_{50}'s summary
Raw Mortality Data
Table 2 MK-936
Table 3 Avermectin B_{1a} Standard
Table 4 Avermectin B_{1a} Standard (repeat)
Table 5 Polar and Moderately polar degradates
Table 6 Non-Polar, and Polar metobolite from thin film dish.

13. STUDY AUTHOR'S CONCLUSIONS:

Photodegradates of Avermectin are less toxic to Daphnids than parent.

14. REVIEWER DISCUSSION

a. Methods/Procedures: The procedures were acceptable. The test materials were Avermectin (MK-936), Avermectin B_{1a} and its photodegrates.

Attachment 1 for a description of the 6 test materials. Basically the photodegradate test materials were generated by exposing the parent to light either in an aqueous solution (Samples 3, 4, and 5) or as a thin film (Sample 6). Both methods of exposure produce the same degradates although in different propotions. The reported concentrations for samples 2-6 were based on radio activity and are this considered to be in ppb of 100% a.i.

The reviewer notes that samples 3 and 4 were tested with one concurrent control as were samples 5 and 6. This does not detract from the validity of the test as the controls were run on the same day as the tests they support. The controls were solvent controls.

Some of the spans between concentrations are greater than normally desired, (i.e. each concentration greater more than 60% greater than nest lower concentration) see test concentrations for samples 3, 4, 5, and 6.

b. Statistics: Independent statistics were conducted. The results are attached. (Attachment 3)

//

c. Discussion/Results:

The results of reviewer statistics using Stephans LC_{50} computer program, are as follows. They generally support the statistics reported.

TEST MATERIAL	BINOMIAL	MOVING AVERAGE	PROBIT
MK-936 #1 ----------	0.22 ppb --	0.24 ppb ----	*
Avermectin B_{1a} #2 ---	0.62 ppb --	0.61 ppb ----	*
Repeat Sample #2 ----	0.42 ppb --	0.47 ppb ----	*
Polar Met Sample #3 -	4.2 ppb --	21.0 ppb ----	*
Mod. Polar Sample #4 ---------	7.1 ppb --	6.3 ppb ----	*
Nonpolar Sample #5 --	25.9 ppb --	25.4 ppb ----	*
Thin Film Meta. #6 --	76.7 ppb --	76.7 ppb ----	66.5

* Since the goodness of fit probability is less than 0.05, results of the probit method are not used.

The span between concentration does not detract from the usefulness of these tests. These tests show the toxicological relationship between the various metabolites of Avermectin. Generally, the metabolites are very highly toxic to daphnids but not as toxic as the parent.

d. Adequacy: These 6 tests are scientifically sound. They fulfill the guideline requirments for acute aquatic invertebrate tests with metabolites and parent material.

15. COMPLETION OF ONE-LINER: One liner completed

16. CBI APPENDIX: N/A

Attachment 1

Description of Test Materials

Avermectin science review

Page _____ is not included in this copy.

Pages 14 through 30 are not included in this copy.

The material not included contains the following type of information:

___ Identity of product inert ingredients

___ Identity of product impurities

___ Description of the product manufacturing process

___ Description of product quality control procedures

___ Identity of the source of product ingredients

___ Sales or other commercial/financial information

___ A draft product label

___ The product confidential statement of formula

___ Information about a pending registration action

X FIFRA registration data

___ The document is a duplicate of page(s) _____

___ The document is not responsive to the request

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

Attachment 3

Reviewer Statistics

122804 AVERMECTIN - MK-936 SAMPLE 1 - DAPHNIA MAGNA LC50

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
1	20	19	95	2.00272E-03
.5	20	16	80	.590897
.25	20	12	60	25.1722
.15	20	5	25	2.06947
.1	20	3	15	.128841
.05	20	0	0	9.53674E-05
.025	20	0	0	9.53674E-05
.0125	20	1	5	2.00272E-03

THE BINOMIAL TEST SHOWS THAT .15 AND .5 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS .216849

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
5	.0629984	.244389	.19505	.318288

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	.734858	6.07845	0

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001.

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED
USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 2.34779
95 PERCENT CONFIDENCE LIMITS = .335175 AND 4.36041

LC50 = .234193
95 PERCENT CONFIDENCE LIMITS = .0723611 AND 1.80344

LC10 = .0673971
95 PERCENT CONFIDENCE LIMITS = 7.09307E-05 AND .152915

****

122804 AVERMECTIN - AVERMECTIN B1A SAMPLE 2 - DAPHNIA MAGNA LC50
****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
1	20	18	90	.0201225
.5	20	6	30	5.76592
.25	20	0	0	9.53674E-05
.15	20	3	15	.128841
.1	20	3	15	.128841
.05	20	1	5	2.00272E-03
.025	20	0	0	9.53674E-05
.0125	20	1	5	2.00272E-03

THE BINOMIAL TEST SHOWS THAT .25 AND 1 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS .620028

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
2	.0760279	.609065	.516037	.742589

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	.980463	4.8714	0

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001.

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED
USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 1.59608
95 PERCENT CONFIDENCE LIMITS = .0156683 AND 3.1765

LC50 = .631463

122804 AVERMECTIN - AVERMECTIN B1A SAMPLE 2 (REPEAT) DAPHNIA LC50

****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
1	20	14	70	5.76592
.5	20	12	60	25.1722
.25	20	4	20	.590897
.15	20	3	15	.128841
.1	20	0	0	9.53674E-05
.05	20	1	5	2.00272E-03
.025	20	0	0	9.53674E-05
.0125	20	1	5	2.00272E-03

THE BINOMIAL TEST SHOWS THAT .25 AND +INFINITY CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS .423532

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
2	.374194	.472116	.285819	.728122

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	.649947	3.54403	1.64437E-03

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 1.69723
95 PERCENT CONFIDENCE LIMITS = .328935 AND 3.06552

LC50 = .543658
95 PERCENT CONFIDENCE LIMITS = .238436 AND 18.688

LC10 = .0970616
95 PERCENT CONFIDENCE LIMITS = .0010611 AND .222816

****

NOTE: THERE WAS CONTROL MORTALITY, BUT AT LEAST ONE
OF THE LOWER CONCENTRATIONS HAD ZERO MORTALITY.
THEREFORE, ABBOTT'S CORRECTION IS NOT APPLICABLE.

122804 AVERMECTIN - POLAR METABOLITE SAMPLE 3 - DAPHNIA MAGNA LC50

****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
100	20	20	100	9.53674E-05
10	20	1	5	2.00272E-03
5	20	12	60	25.1722
1	20	4	20	.590897
.5	20	0	0	9.53674E-05
.3	20	0	0	9.53674E-05

THE BINOMIAL TEST SHOWS THAT 1 AND 100 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 4.18588

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
2	.279044	21.0816	10.3396	56.0744

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
6	1.34662	7.13779	0

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001.

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED
USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 1.35652
95 PERCENT CONFIDENCE LIMITS =-.217639 AND 2.93069

LC50 = 10.2629
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 1.18865
95 PERCENT CONFIDENCE LIMITS = 0 AND 8.71067

****

NOTE: BECAUSE THERE WAS CONTROL MORTALITY, AND NONE
OF THE LOWER CONCENTRATIONS PRODUCED ZERO MORTALITY,
THE DATA HAS BEEN SUBJECTED TO ABBOTT'S CORRECTION.

122804 AVERMECTIN - MOD. POLAR MET. SAMPLE 4 - DAPHNIA MAGNA LC50

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
100	19	19	100	1.90735E-04
10	19	14	73.6842	.960541
5	19	5	26.3158	3.17841
1	19	4	21.0526	.960541
.5	19	0	0	1.90735E-04
.3	19	3	15.7895	.221252

THE BINOMIAL TEST SHOWS THAT 1 AND 10 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 7.07107

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	.257031	6.28434	2.48171	16.0054

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	.591902	3.08122	.0150918

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED
USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 1.33909
95 PERCENT CONFIDENCE LIMITS = .308858 AND 2.36932

LC50 = 5.1397
95 PERCENT CONFIDENCE LIMITS = 1.21526 AND 84.1138

LC10 = .578803
95 PERCENT CONFIDENCE LIMITS = 1.10776E-03 AND 2.07563

****

122804 AVERMECTIN - NONPOLAR MET. SAMPLE 5 - DAPHNIA MAGNA LC50

****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
100	20	19	95	2.00272E-03
10	20	3	15	.128841
5	20	1	5	2.00272E-03
1	20	1	5	2.00272E-03
.5	20	1	5	2.00272E-03
.3	20	0	0	9.53674E-05

THE BINOMIAL TEST SHOWS THAT 10 AND 100 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 25.9197

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
2	.0871172	25.3619	17.2541	41.2346

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
6	.904526	3.89955	3.60817E-03

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED
USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 1.56853
95 PERCENT CONFIDENCE LIMITS = .0767546 AND 3.0603

LC50 = 22.9291
95 PERCENT CONFIDENCE LIMITS = 3.77517 AND 2.69144E+07

LC10 = 3.55394
95 PERCENT CONFIDENCE LIMITS = 7.39678E-11 AND 15.0195

****

122804 AVERMECTIN - THIN FILM MET. SAMPLE 6 - DAPHNIA MAGNA LC50

****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
100	20	11	55	41.1901
10	20	3	15	.128841
5	20	4	20	.590897
1	20	0	0	9.53674E-05
.5	20	0	0	9.53674E-05
.3	20	0	0	9.53674E-05

THE BINOMIAL TEST SHOWS THAT 10 AND +INFINITY CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 76.6549

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
1	.547919	76.6549	32.6799	1537.85

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	.163366	1	.588108

SLOPE = 1.11853

95 PERCENT CONFIDENCE LIMITS = .666434 AND 1.57062

LC50 = 66.4504

95 PERCENT CONFIDENCE LIMITS = 30.9148 AND 260.512

LC10 = 4.86491

95 PERCENT CONFIDENCE LIMITS = 1.56586 AND 9.93066

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